



Inflorescence hydrocarbons of some species of *Solanum* L., section *Tuberarium* (Dunal) Bitt., and their taxonomic significance
by Helen Cameron Mecklenburg

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY in Genetics
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Abstract:

A study of the hydrocarbon content of flowers of 35 tuberbearing *Solanum* species has yielded results applicable to the taxonomy of this group. These alkanes, which occur as a portion of the waxy coating on the surface of the plant parts, were purified and the relative amounts of the various components determined using gas-liquid chromatography*. All species examined were found to contain both branched (C₂₅-C₃₂) and normal (C₂₅-C₃₁) components.

In general, the results of this work tended to confirm relationships among species postulated on the basis of morphological, cytological, and immunological studies. The types of patterns obtained did not seem to reflect ecological adaptations of the species involved. For example, the South American species *S. acaule* showed considerable interspecific variability, but in no sample tested did it resemble *S. demissum*, its Mexican high-altitude counterpart.

On the other hand, similar patterns were often obtained for species considered morphologically similar but how isolated geographically or by differences in ploidy level. Evidence was thus obtained applicable to determining relationships of South American to Mexican species, and of diploids to polyploids.

It appears that this type of approach will prove to be of value in the study of this complex group of species, in that it provides another tool for elucidating relationships irrespective of complexities associated with differences in ploidy level.

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ABSTRACT

A study of the hydrocarbon content of flowers of 35 tuber-bearing Solanum species has yielded results applicable to the taxonomy of this group. These alkanes, which occur as a portion of the waxy coating on the surface of the plant parts, were purified and the relative amounts of the various components determined using gas-liquid chromatography. All species examined were found to contain both branched (C₂₅-C₃₂) and normal (C₂₅-C₃₁) components.

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CHAPTER I

INTRODUCTION

A. Taxonomy

The family Solanaceae is a large and varied one, consisting of about 90 genera and 2000 species (Correll, 1962). The genus Solanum L., embracing more than two thirds of the species in the family, includes the species S. tuberosum, the common potato. Solanum is distinguished from other Solanaceae genera by its 2-locular ovary, distinctly curved embryo, five fertile stamens of equal or nearly equal length, fruit a berry, and either free anthers splitting through an opening in the apex, or anthers connected in a tube (Wettstein, 1897).

Since Dunal's work (1852) no one person has attempted to consider the genus Solanum as a whole (Correll, 1962). Very little work was done on the genus, including the recognition of newly found species, from Dunal's time until Bitter's invaluable contributions (1911-1914). Bitter developed broadly the concept of sections proposed by Dunal (Correll, 1962). He raised Dunal's subsection Tuberarium to section status; divided section Tuberarium into two subsections, Basarthrum and Hyperbasarthrum; and described more than 50 new species and varieties in section Tuberarium alone.

Section Tuberarium, distinguished by its short stamens and articulated pedicel, is further subdivided into Basarthrum, if the

articulation is at the base, or Hyperbasarthrum if the articulation is somewhat above the base. All the tuberous species fall into the subsection Hyperbasarthrum. With the exception of four species, three of which are of other genera, examined for comparative purposes, this work deals only with tuberous species included in subsection Hyperbasarthrum.

Beginning with Bitter, all systematists working with this subsection have found it necessary to divide it into a number of series, due to the large number of entities involved (Bitter, 1912; Rydberg, 1924; Juzepczuk and Bukasov, 1929; Juzepczuk, 1937; Bukasov, 1937, 1939; Hawkes, 1944, 1954, 1958; Cardenas and Hawkes, 1946; Correll, 1952, 1962). Since Bitter's time, the recognition of many new species has resulted in the expansion and reorganization of his original series assignments. Hawkes (1958) recognized 17 series containing 114 species, 108 wild and 6 cultivated. This was a welcome reduction from the 225 species he had formerly recognized. Correll (1962) divides the subsection into 26 series with 157 species.

Differences between Hawkes' and Correll's treatments are not as pronounced as the above figures might indicate. Hawkes tends to group more divergent entities into fewer species and series than does Correll, but their opinions as to the affinities of the various groups are not too divergent. For example, Hawkes (1958) assigned S. clarum to series Bulbocastana on the basis of its simple leaves; originally, Correll did the same. In 1962, however, Correll elected to place it in a separate series, Clara.

